

## CLAIMS

What is claimed and desired to be covered by Letters Patent is as follows:

1. A tow bar for connecting a towed vehicle to a towing vehicle, the tow bar comprising:
  - (a) a towing vehicle connection mechanism connected to the towing vehicle, the towing vehicle connection mechanism defining a fore-to-aft oriented towing vehicle axis that is operatively fixed relative to the towing vehicle and to the towing vehicle connection mechanism;
  - (b) a towed vehicle connection mechanism connected to the towed vehicle, the towed vehicle connection mechanism defining a horizontal transversely-oriented towed vehicle axis that is operatively fixed relative to the towed vehicle and to the towed vehicle connection mechanism; and
  - (c) an interconnecting mechanism connecting the towing vehicle connection mechanism to the towed vehicle connection mechanism, the interconnecting mechanism defining:
    - (1) an interconnection central point, and

- (2) an interconnection vertical axis spaced rearwardly from the interconnection central point; and
- (d) wherein the interconnecting mechanism is configured and structured to accommodate substantially all pitch and roll movements, including any and all combinations thereof, between the towing vehicle axis and the towed vehicle axis, at and about the interconnection central point; and wherein the interconnecting mechanism is further configured and structured to accommodate substantially all yaw movements, between the towing vehicle axis and the towed vehicle axis, at and about the interconnection vertical axis.

- 2. The tow bar as described in claim 1, wherein the towing vehicle connection mechanism includes a hitching mechanism which is structured and configured to be inserted and secured in a conventional receiver hitch of the towing vehicle, wherein the hitching mechanism is affixed to the interconnecting mechanism.

3. The tow bar as described in claim 1, wherein the towed vehicle connection mechanism includes a least one bracket secured to the towed vehicle.
4. The tow bar as described in claim 1, further including a latching mechanism structured and configured to secure the interconnecting mechanism in a stowed configuration.
5. The tow bar as described in claim 1, wherein the interconnecting mechanism includes:
  - (a) a spherically-shaped ball member having a radius and a ball member center point; and
  - (b) a body member having a main cavity with a main cavity center point and a radius of curvature, which is slightly greater than the radius of the ball member, and
  - (c) wherein the ball member is rotatively captured within the body member with the ball member center point and the main cavity center point coinciding with the interconnection central point.

6. The tow bar as described in claim 5, wherein the body member includes:
- (a) an upper body portion having a downwardly-facing, partially hemispherically-shaped upper cavity with a radius of curvature, which is slightly greater than the radius of the ball member, and a center of curvature;
  - (b) a lower body portion having an upwardly-facing, partially hemispherically-shaped lower cavity with a radius of curvature, which is identical to the radius of curvature of the upper cavity of the upper portion, and a center of curvature; and
  - (c) fastening means; and
  - (d) wherein assembly of the upper body portion, the lower body portion and the ball member with the fastening means forms the main cavity wherein the center of curvature of the upper cavity of the upper body portion, the center of curvature of the lower cavity of the lower body portion, and the ball member center point all coincide with the interconnection central point, rotatively capturing the ball member therein.

7. The tow bar as described in claim 6 wherein, after assembly with the fastening means, the upper body portion abuts the lower body portion along a plane that passes through the main cavity center point.
8. The tow bar as described in claim 6 wherein the interconnecting mechanism further includes:
  - (a) a slot having a slot width, the slot being cooperatively formed by assembly of the body member from the upper body portion and the lower body portion;
  - (b) a shaft member having a forward end affixed to the towing vehicle connection mechanism, a rearward end affixed to the ball member, and a diameter which is slightly smaller than the slot width, the shaft member extending forwardly from the ball member through the slot.
9. The tow bar as described in claim 8, wherein
  - (a) the shaft member includes a transversely-oriented disc which separates the shaft member into a proximal end and a distal end; and
  - (b) the ball member comprises

- (1) a proximal portion having a partial bore or throughbore having a diameter dimensioned to fit snugly around the proximal end of the shaft member, and
- (2) a distal portion having a throughbore having a diameter dimensioned to fit snugly around the distal end of the shaft member; and
- (c) wherein the spherical shape of the ball member is provided by assembly of the proximal portion of the ball member onto the proximal end of the shaft member and by assembly of the distal portion of the ball member onto the proximal end of the shaft member with the transversely-oriented disc sandwiched between the proximal and distal portions of the ball member.

10. The tow bar as described in claim 8 wherein the interconnecting mechanism further includes:

- (a) a rearwardly-projecting towbar arm connector affixed to the body member; and
- (b) at least one towbar arm having a forward end and a rear end, the forward end thereof being pivotally connected to the towbar arm connector and the rear

end thereof being connected to the towed vehicle connection mechanism.

11. The tow bar as described in claim 10 wherein the at least one towbar arm includes two towbar arms, each having a forward end and a rear end, wherein the rear ends thereof are operatively spaced apart and connected to the towed vehicle connection mechanism and wherein the forward ends thereof are not spaced apart and are pivotally connected to the towbar arm connector to pivot about the interconnection vertical axis.
12. The tow bar as described in claim 8, further comprising:
  - (a) a latching mechanism structured and configured to secure the interconnecting mechanism in a stowed configuration, the latching mechanism including:
    - (1) a first latching device connected to the towbar arm connector, and
    - (2) a second latching device affixed to the towing vehicle connection mechanism; and
  - (b) wherein, as the body member is rotated about the ball member to displace the slot along the shaft

member wherein the towbar arm connector is disposed in a generally upright orientation, the first latching device and the second latching device cooperatively and releasably secure the interconnecting mechanism in the stowed configuration.

13. The tow bar as described in claim 5, wherein the body member includes:

- (a) a first body portion having a rearwardly-facing, partially hemispherically-shaped first cavity with a radius of curvature, which is slightly greater than the radius of the ball member, and a center of curvature;
- (b) a second body portion having a forwardly-facing, partially hemispherically-shaped second cavity with a radius of curvature, which is identical to the radius of curvature of the first cavity of the first body portion, and a center of curvature;
- (c) a third body portion having a forwardly-facing, partially hemispherically-shaped third cavity with a radius of curvature, which is identical to the radius of curvature of the second cavity of the

second body portion, and a center of curvature;  
and

(d) fastening means; and

(e) wherein assembly of the first body portion, the second body portion, the third body portion and the ball member with the fastening means forms the main cavity wherein the center of curvature of the first cavity of the first body portion, the center of curvature of the second cavity of the second body portion, the center of curvature of the third cavity of the third body portion and the ball member center point all coincide with the main cavity center point, rotatively capturing the ball member therein.

14. The tow bar as described in claim 13 wherein, wherein the second and third body portions are of unitary construction.

15. The tow bar as described in claim 13 wherein, after assembly of the body member with the fastening means, the second and third body portions abut the first body portion along a plane that passes through the interconnection central point.
16. The tow bar as described in claim 13 wherein the interconnecting mechanism further includes:
- (a) a slot having a slot width, the slot being cooperatively formed between the second and third body portions by assembly of the body member; and
  - (b) a shaft member having a forward end, a rearward end and a diameter, which is slightly smaller than the slot width, the forward end thereof being affixed to the ball member and the rearward end thereof extending rearwardly through the slot.
17. The tow bar as described in claim 16, wherein
- (a) the shaft member includes a transversely-oriented disc which separates the shaft member into a proximal end and a distal end; and
  - (b) the ball member comprises
    - (1) a proximal portion having a partial bore or

throughbore having a diameter dimensioned to fit snugly around the proximal end of the shaft member, and

- (2) a distal portion having a throughbore having a diameter dimensioned to fit snugly around the distal end of the shaft member; and
- (c) wherein the spherical shape of the ball member is provided by assembly of the proximal portion of the ball member onto the proximal end of the shaft member and by assembly of the distal portion of the ball member onto the proximal end of the shaft member with the transversely-oriented disc sandwiched between the proximal and distal portions of the ball member.

18. The tow bar as described in claim 16 wherein the interconnecting mechanism further includes:

- (a) a towbar arm connector affixed to the shaft member; and
- (b) at least one towbar arm having a forward end and a rear end, the forward end thereof being pivotally connected to the towbar arm connector to pivot about the interconnection vertical axis and the

rear end thereof being connected to the towed vehicle connection mechanism.

19. The tow bar as described in claim 18 wherein the at least one towbar arm includes two towbar arms, each having a forward end and a rear end, wherein the rear ends thereof are operatively spaced apart and connected to the towed vehicle connection mechanism and wherein the forward ends thereof are not spaced apart and are pivotally connected to the towbar arm connector to pivot about the interconnection vertical axis.
20. The tow bar as described in claim 19, wherein the forward ends of the two towbar arms can pivot separately or in unison about the interconnection vertical axis.
21. The tow bar as described in claim 16, further comprising:
  - (a) a latching mechanism structured and configured to secure the interconnecting mechanism in a stowed configuration, the latching mechanism including:
    - (1) a first latching device affixed to the ball

member, and

(2) a second latching device affixed to the body member; and

(b) wherein, as the ball member is rotated within the body member to displace the shaft member to a generally upright orientation, the first latching device in conjunction with the second latching device releasably secures the interconnecting mechanism in the stowed configuration.

22. A tow bar for connecting a towed vehicle to a towing vehicle, the tow bar comprising:

(a) a towing vehicle connection mechanism connected to the towing vehicle, the towing vehicle connection mechanism

(1) including a hitching mechanism structured and configured to be received by a conventional receiver hitch of the towing vehicle, and

(2) defining a fore-to-aft oriented towing vehicle axis which is operatively fixed relative to the towing vehicle and to the towing vehicle connection mechanism;

(b) a towed vehicle connection mechanism connected to

the towed vehicle, the towed vehicle connection mechanism

- (1) including at least one bracket attached to the towed vehicle, and
  - (2) defining a horizontal transversely-oriented towed vehicle axis which is operatively fixed relative to the towed vehicle and to the towed vehicle connection mechanism;
- (c) an interconnecting mechanism connecting the towing vehicle connection mechanism to the towed vehicle connection mechanism, the interconnecting mechanism defining an interconnection central point, defining an interconnection vertical axis spaced rearwardly from the interconnection central point, and including:
- (1) a spherically-shaped ball member having a radius and a ball member center point,
  - (2) a body member having a main cavity with a main cavity center point and a radius of curvature, which is slightly greater than the radius of the ball member, the body member further including:
    - (A) an upper body portion with a

- downwardly-facing, partially  
hemispherically-shaped upper cavity  
having a radius of curvature, which is  
slightly greater than the radius of the  
ball member, and a center of curvature,
- (B) a lower body portion with an  
upwardly-facing, partially  
hemispherically-shaped lower cavity  
having a radius of curvature, which is  
identical to the radius of curvature of  
the upper cavity of the upper body  
portion, and a center of curvature, and
- (C) fastening means, and
- (D) wherein assembly of the upper body  
portion, the lower body portion and the  
ball member with the fastening means  
forms the main cavity of the body member  
wherein the center of curvature of the  
upper cavity of the upper body portion,  
the center of curvature of the lower  
cavity of the lower body portion, and  
the ball member center point all  
coincide with the main cavity center

- point, rotatively capturing the ball member therein; and wherein the upper body portion abuts the lower body portion along a plane that passes through the main cavity center point,
- (3) a slot having a slot width, the slot being cooperatively formed by the upper body portion in conjunction with the lower body portion,
  - (4) a shaft member having a forward end affixed to the towing vehicle connection mechanism, a rearward end affixed to the ball member, and a diameter which is slightly smaller than the slot width, wherein the shaft member extends forwardly from the ball member through the slot,
  - (5) a rearwardly-projecting towbar arm connector affixed to the body member, and
  - (6) a pair of towbar arms, each having a forward end and a rear end, wherein the rear ends thereof are operatively spaced apart and connected to the towed vehicle connection mechanism, and the forward ends thereof are

not spaced apart and are movably connected to the towbar arm connector to pivot about the interconnection vertical axis; and

- (d) a latching mechanism structured and configured to secure the interconnecting mechanism in a stowed configuration, the latching mechanism including:
  - (1) a first latching device connected to the towbar arm connector, and
  - (2) a second latching device affixed to the towing vehicle connection mechanism, and
  - (3) wherein, as the body member is rotated about the ball member to displace the slot along the shaft member to dispose the towbar arm connector in a generally upright orientation, the first latching device in conjunction with the second latching device releasably secures the interconnecting mechanism in the stowed configuration; and
- (e) wherein the interconnecting mechanism is configured and structured to accommodate substantially all pitch and roll movements including any and all combinations thereof, between the towing vehicle axis and the towed

vehicle axis, at and about the interconnection central point; and wherein the interconnecting mechanism is further configured and structured to accommodate substantially all yaw movements, between the towing vehicle axis and the towed vehicle axis, at and about the interconnection vertical axis.

23. A tow bar for connecting a towed vehicle to a towing vehicle, the tow bar comprising:

(a) a towing vehicle connection mechanism connected to the towing vehicle, the towing vehicle connection mechanism

(1) including a hitching mechanism structured and configured to be received by a conventional receiver hitch of the towing vehicle, and

(2) defining a fore-to-aft oriented towing vehicle axis that is operatively fixed relative to the towing vehicle and to the towing vehicle connection mechanism;

(b) a towed vehicle connection mechanism connected to the towed vehicle, the towed vehicle connection mechanism

- (1) including at least one bracket attached to the towed vehicle, and
  - (2) defining a horizontal transversely-oriented towed vehicle axis that is operatively fixed relative to the towed vehicle and to the towed vehicle connection mechanism;
- (c) an interconnecting mechanism connecting the towing vehicle connection mechanism to the towed vehicle connection mechanism, the interconnecting mechanism defining an interconnection central point, defining an interconnection vertical axis spaced rearwardly from the interconnection central point, and including:
  - (1) a spherically-shaped ball member having a radius and a ball member center point,
  - (2) a body member having a main cavity with a main cavity center point and a radius of curvature, which is slightly greater than the radius of the ball member, the body member further including:
    - (A) a first body portion having a rearwardly-facing, partially hemispherically-shaped first cavity with

a radius of curvature, which is slightly greater than the radius of the ball member, and a center of curvature,

- (B) a second body portion with a forwardly-facing, partially hemispherically-shaped second cavity with a radius of curvature, which is identical to the radius of curvature of the first cavity of the first body portion, and a center of curvature, and
- (C) a third body portion with a forwardly-facing, partially hemispherically-shaped third cavity with a radius of curvature, which is identical to the radius of curvature of the second cavity of the second body portion, and a center of curvature, and
- (D) fastening means, and
- (E) wherein assembly of the first body portion, the second body portion, the third body portion and the ball member with the fastening means forms the main cavity of the body member wherein the

center of curvature of the first cavity of the first body portion, the center of curvature of the second cavity of the second body portion, the center of curvature of the third cavity of the third body portion, and the ball member center point all coincide with the main cavity center point, rotatively capturing the ball member therein; and wherein the second and third body portions abut the first body portion along a plane that passes through the main cavity center point,

- (3) a slot having a slot width, the slot being cooperatively formed between the second and third body portions by assembly of the body member,
- (4) a shaft member having a forward end, a rearward end and a diameter which is slightly smaller than the slot width, the forward end thereof being affixed to the ball member, and the rearward end thereof extending rearwardly through the slot,

- (5) a towbar arm connector affixed to the shaft member, and
  - (6) a pair of towbar arms, each having a forward end and a rear end, wherein the rear ends thereof are operatively spaced apart and connected to the towed vehicle connection mechanism, and the forward ends thereof are not spaced apart and are movably connected to the towbar arm connector to pivot about the interconnection vertical axis; and
- (d) a latching mechanism structured and configured to secure the interconnecting mechanism in a stowed configuration, the latching mechanism including:
- (1) a first latching device affixed to the ball member, and
  - (2) a second latching device affixed to the body member, and
  - (3) wherein, as the ball member is rotated within the body member to displace the shaft member along the slot to thereby dispose the shaft member in a generally upright orientation, the first latching device in conjunction with the second latching device releasably secures

the interconnecting mechanism in the stowed configuration; and

- (e) wherein the interconnecting mechanism is configured and structured to accommodate substantially all pitch and roll movements including any and all combinations thereof, between the towing vehicle axis and the towed vehicle axis, at and about the interconnection central point; and wherein the interconnecting mechanism is further configured and structured to accommodate substantially all yaw movements, between the towing vehicle axis and the towed vehicle axis, at and about the interconnection vertical axis.